
Investigating three-dimensional dynamics of a rocket on a launch pad subjected to wind loading

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The article deals with the issues related to the methodology of detecting possible resonant flexural vibrations of a rocket subjected to wind loads. As part of the methodology under development, we provide an algorithm for calculating the first approximation of how the rocket body responds to external wind loading. We present the calculation results as a table containing full wind loading distribution over altitude. Besides, so as to more thoroughly investigate the issue of resonant flexural vibrations appearing, we analysed the effect that the perturbing factors of wind loading have on the behaviour of a cylindrically shaped structure. It showed a significant increase in the lateral force as compared to drag for a quite narrow Strouhal number range. We present the results in the form of plotting power characteristics (ratios of the lateral force coefficient to the drag coefficient) against the Strouhal number.

Keywords: rocket, lateral force, wind load, resonant flexural vibrations

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